

**Two new species of *Acacia* (Fabaceae: Mimosoideae) with conservation significance from Banded Iron Formation ranges in the vicinity of Koolyanobbing, Western Australia**

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**Abstract**

Maslin, B.R. Two new species of *Acacia* (Fabaceae: Mimosoideae) with conservation significance from Banded Iron Formation ranges in the vicinity of Koolyanobbing, Western Australia. *Nuytsia* 24: 131–138 (2014). Two geographically restricted species of *Acacia* Mill., *A. haematites* Maslin and *A. shapelleae* Maslin, from Banded Iron Formation (BIF) ranges in the south-west extremity of the arid zone of Western Australia are described. *Acacia haematites* occurs on the Koolyanobbing Range (close to the township of Koolyanobbing) while *A. shapelleae* occurs on the Helena and Aurora Range which is located about 40 km to the north of Koolyanobbing. Both these geographically restricted species occur in areas of mining interests and are therefore classified as Priority One under Department of Parks and Wildlife Conservation Codes for Western Australian Flora. The two new species belong to *Acacia* sect. *Acacia* and are allopatric with respect to their closest relatives (*A. acuarria* W.Fitzg. and *A. glutinosissima* Maiden & Blakely respectively) which are reasonably widespread in the central and northern wheatbelt region of the South West Botanical Province.

**Introduction**

As discussed by Gibson *et al.* (2007, 2012) considerable botanical survey and research has been conducted in recent years on the Banded Iron Formation (BIF) ranges of the Yilgarn Craton in southern Western Australia. These botanically rich ranges appear to represent both refugial habitats of great antiquity and areas of recent speciation, and most are subject to current mining exploration or mining activity (Gibson *et al.*, *loc. cit.*). Recent analyses by Gibson and colleagues (Gibson *et al.* 2010, 2012) have identified two significant hotspots for plant diversity involving these BIF ranges, the eastern hotspot is centred on the Helena and Aurora Range north of Koolyanobbing and the western hotspot in the general vicinity of Morawa, centred on Koolanooka Hills and Blue Hills. These hotspots occur close to the boundary between the arid zone (Eremaean Botanical Province) and the species-rich South-West Botanical Province. The two new species described in the present paper are associated with the eastern hotspot.

Gibson *et al.* (2010) enumerated 22 plant taxa that are either restricted to, or which have distributions centered on, four BIF ranges within the eastern hotspot referred to above. Among these is *Acacia* sp. Bungalbin Hill (J.J. Alford 1119) that is described below as *A. shapelleae* Maslin and which occurs on the Helena and Aurora Range. The second new species described here, *A. haematites* Maslin, was unknown to Gibson *et al.* (2010); it occurs on the Koolyanobbing Range which is located about 40 km

south of the Helena and Aurora Range. Both these geographically restricted new species grow in areas that are subject to mining interests and as such are classified as Priority One taxa under Department of Parks and Wildlife Conservation Codes for Western Australian Flora. Their closest relatives are located several hundred kilometers to the west, in the northern and/or central wheatbelt region of the South-West Botanical Province.

Both new species described here belong to *Acacia* Mill. sect. *Acacia* (formerly *Acacia* sect. *Phyllodineae* DC.) and are included in the online identification key to Australian acacias (Maslin 2014).

### Taxonomy

***Acacia haematites*** Maslin, *sp. nov.*

*Type*: Koolyanobbing Range, Western Australia [precise locality withheld for conservation reasons], 16 September 2009, G. Cockerton, S. Regan, J. Warden & J. O'Brien LCH 28974 (*holo*: PERTH 08520453; *iso*: MEL, PERTH 08520542).

Diffuse, much-branched *shrub* to *c.* 1 m tall, the upper branches dividing into  $\pm$ numerous, short, straight, rigid, spinose or sub-spinose branchlets, the oldest of which are devoid of phyllodes. *Bark* grey. *Branchlets* terete, finely ribbed at extremities, the ribs yellow, not or only slightly raised and glabrous or more commonly hirtellous with very short, straight, patent, tubercle-based hairs. *Stipules* early caducous, mostly present only on new shoots, linear to narrowly oblong or narrowly triangular, 1–2 mm long, yellow to light brown, sparsely hairy with hairs often confined to margins, not fused. *Phyllodes* narrowly oblong to narrowly lanceolate, narrowed towards apices, sometimes slightly angled at the gland, 6–12 mm long (including cusp), 1–2 mm wide, straight, patent, rigid, flat, green, glabrous or hirtellous as on branchlets but hairs slightly shorter; *midrib*  $\pm$ prominent and central; *lateral nerves* not visible; *upper margin* 2-nerved below the gland and 1-nerved above the gland; *apices* narrowed to a straight, rigid, slender, subulate, dark brown, pungent cusp 1–1.5 mm long; *base* sessile, the pulvinus absent or represented by a vestigial rim of yellow or light brown tissue. *Gland* situated on upper margin of phyllode (1–)2–5 mm above the base, not prominent, circular, 0.2–0.3 mm diam., not raised, light brown. *Inflorescences* simple, single within axil of phyllodes; *heads* globular, loosely 5–9-flowered, sessile or sub-sessile; *peduncles* to 1(–1.5) mm long, glabrous, subtended at base by a pair of early caducous, basally fused brown bracts *c.* 1 mm long. *Bracteoles* widely spatulate, sessile or sub-sessile, 1–1.5 mm long, *c.* 1 mm wide, scarious, concave, light or dark brown, obtuse, fimbriolate otherwise glabrous, nerveless or faintly striate. *Flowers* 5-merous; *calyx* widely turbinate, *c.* 1/2 the length of the petals, 1–1.3 mm wide at apex, gamosepalous, very shortly dissected (for less than 1/4 its length) into rounded, slightly inflexed, non-thickened,  $\pm$ sparsely fimbriolate lobes, calyx tube glabrous or sub-glabrous and smooth or faintly striate; *petals* 2 mm long, glabrous, nerveless or 1-nerved. *Pods*  $\pm$ linear to sub-moniliform, to *c.* 35 mm long (expanded length), 2.5–3 mm wide, thinly coriaceous, irregularly strongly curved to openly coiled or twisted, undulate, prominently rounded over seeds with umbo extending to margin of valves, shallowly to strongly constricted between the seeds, glabrous, dark brown to black, glabrous, very obscurely reticulately nerved, marginal nerve thin and not or scarcely thickened. *Seeds* (few seen) longitudinal in pods, obloid-ellipsoid but truncate along edge adjacent to aril, 2.5–3 mm long, 1.5–2 mm wide, turgid (1.2–1.7 mm thick), dark brown, often with remnants of internal pod tissue persistent on surface, slightly shiny; aril clavate, straight, extending *c.* 1/2-way down one side of the seed. (Figure 1)

*Characteristic features.* Diffuse *shrub* to *c.* 1 m tall, with  $\pm$ numerous, short, straight, rigid, spinose or sub-spinose branchlets. *Stipules* early caducous, not fused. *Phyllodes* narrowly oblong to narrowly

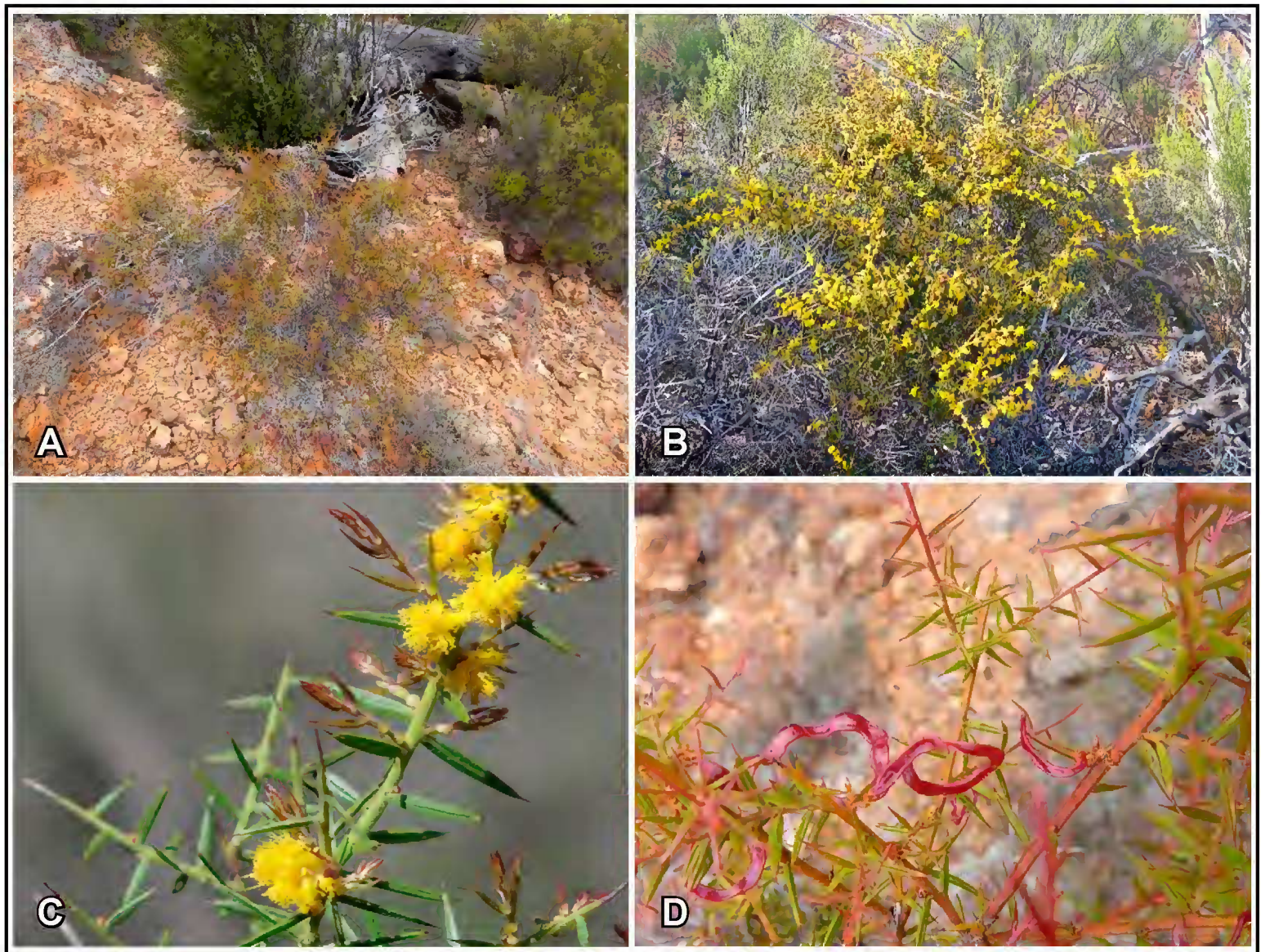


Figure 1. *Acacia haematites*. A – habit and habitat; B – habit showing spreading branches; C – spinescent branchlets with patent, rigid, pungent phyllodes and new shoots; D – immature pods. Photographs by David Coultas (A, B, D) and Geoff Cockerton (C).

lanceolate, narrowed towards apices, 6–12 mm long (including cusp), 1–2 mm wide, flat, straight, patent, rigid, 1-nerved, pungent by slender cusp 1–1.5 mm long, sessile (pulvinus  $\pm$ absent). *Heads*  $\pm$ sessile, 5–9-flowered. *Bracteoles* widely spatulate,  $\pm$ sessile,  $1\text{--}1.5 \times c. 1$  mm, concave, brown, obtuse. *Flowers* 5-merous; *calyx* gamosepalous. *Pods* 2.5–3 mm wide, irregularly strongly curved to openly coiled or twisted, undulate, prominently rounded over seeds, dark brown to black.

*Other specimens examined.* WESTERN AUSTRALIA: [localities withheld for conservation reasons] 31 Aug. 2013, D. Coultas & S. Coultas 145-Opp 01 (PERTH); 12 Aug. 1971, B.R. Maslin 1958 A (PERTH).

*Distribution.* This poorly collected species is known from only a single BIF range near Koolyanobbing (about 50 km north-east of Southern Cross), namely, the Koolyanobbing Range. This area is located in the south-west extremity of the Eremaean Botanical Province, near the border of the South-West Botanical Province. In recent years there has been extensive survey of BIF ranges in this area (e.g. Helena and Aurora Range, Mount Jackson Range, Johnson Range, Windarling Peak, Die Hardy Range and Mount Elvire) and the new species has not been located on any of these. It appears, therefore, that *A. haematites* is geographically restricted and, as noted below, is habitat specific. The known populations occur within areas covered by existing mining tenements and two other Priority taxa occur in association with it, namely, *Hibbertia lepidocalyx* subsp. *tuberculata* (P3) and *Styphelia* sp. Bullfinch (M. Hislop 3574) (P3).

*Habitat.* *Acacia haematites* grows on a haematite-rich BIF range where it occurs in red loam or pale-coloured sandy clay on the eroded slopes below massive ironstone or lateritized duricrust outcrops. It occurs in open shrubland of *Hibbertia lepidocalyx* subsp. *tuberculata*, *Melaleuca hamata*, *M. leiocarpa* and *Styphelia* sp. Bullfinch (M. Hislop 3574), with scattered emergent *Callitris columellaris* and *Eucalyptus capillosa*.

*Phenology.* The paucity of collections make it difficult to accurately determine the phenology of this species. Plants at peak anthesis have been collected in August, but some flowers persist to mid-September. Pods are initiated on some plants at the end of August. The few mature seeds that have been seen were collected in mid-September, but these are most probably ones that persisted on the plants from the previous year's fruiting event.

*Conservation status.* *Acacia haematites* is to be listed as Priority One under Department of Parks and Wildlife Conservation Codes for Western Australian Flora (A. Jones pers. comm.).

*Etymology.* The species name *haematites* is Latin 'blood stone, a kind of red iron ore, hematite'. The epithet is applied here as a noun in apposition.

*Common name.* Koolyanobbing Ironstone Wattle.

*Affinities.* *Acacia haematites* is most closely related to *A. acuaria* W.Fitzg. Indeed, the outlier specimen from Bullfinch (B.R. Maslin 1958 A) that was noted by Maslin (2001: 473) under *A. acuaria* is *A. haematites*. The second outlier noted in the same place from the nearby Mount Jackson (K.R. Newbey 9098) is now known to be the long phyllode variant of *A. intricata* S.Moore that is discussed by Maslin (*op. cit.* 532) (see below).

*Acacia haematites* and *A. acuaria* are both low, spreading shrubs with spinose branchlets, relatively short, often patent, 1-nerved phyllodes with distinctively pungent tips, globular heads of 5-merous flowers with gamosepalous calyces and short but broad, concave,  $\pm$ sessile bracteoles, and strongly curved to openly coiled or twisted, narrow pods that are clearly rounded over the longitudinal seeds. *Acacia acuaria* is most readily distinguished from the new species by its distinctly pedunculate, more numerous flowered heads and its stipule morphology, but there are also differences in the phyllodes and pods; the two species are allopatric. The stipules of both species are early caducous (normally present only on the new shoots) but in *A. acuaria* they are fused, subtend the bases of the developing phyllodes and fall away as a single unit (by contrast the stipules of *A. haematites* are completely free and flank either side of the developing phyllodes). The peduncles of *A. acuaria* are 4–12 mm long and the heads are 14–23-flowered. Other characters that help distinguish *A. acuaria* from *A. haematites* are its phyllodes that are terete to sub-terete (but flat when dry), more slender (normally not exceeding c. 1 mm in width), less prominently 1-nerved and have a discernible (but short) basal pulvinus, and its pods that are slightly broader (3.5–5 mm wide). *Acacia acuaria* is widespread and relatively common in the northern and central wheatbelt region of the South-West Botanical Province, extending from the Murchison River south-east to near Merredin; it extends slightly into the adjacent Eremaean Botanical Province in the area to the east of Morawa and Wubin. *Acacia haematites* occurs about 300 km to the south-east of the closest occurrence of *A. acuaria*.

*Acacia haematites* superficially resembles the long phyllode forms of *A. intricata* that occurs near Koolyanobbing and elsewhere (*vide* Maslin 2001: 532 and 2014), especially because both taxa have spinescent branchlets, short, rigid, patent, pungent, sessile phyllodes and globular heads. Around

Koolyanobbing, however, *A. intricata* grows on red earth flats, not BIF ranges, and morphologically it is most readily distinguished from the new species by its bracteoles and calyces that are either absent or highly reduced and by its phyllodes that are thicker and which are strongly 2-nerved along their upper margin (the nerves extending from base to apex, not coalescing at the gland as occurs in *A. haematites*). Better fruiting material from Koolyanobbing plants of both these taxa is needed to better assess the differences between them.

***Acacia shapelleae* Maslin, *sp. nov.***

*Type:* Helena and Aurora Range, Western Australia [precise locality withheld for conservation reasons], 16 August 2011, *J. Jackson & V. Jackson* 230 (*holo:* PERTH 08365822; *iso:* CANB, K, MEL, NSW).

*Acacia* sp. Bungalbin Hill (J.J. Alford 1119), Western Australian Herbarium, in *FloraBase*, <http://florabase.dpaw.wa.gov.au> [accessed June 2014].

Erect, multi-stemmed, rounded or obconic, glabrous *shrub* to 3 m tall and 4 m across, resinous and viscid (but the resin not sticky when dry) with a strong camphor-like odour when fresh. *Bark* light grey, finely roughened. *Branchlets* terete, ribs not visible, the upper branchlets brown but partially or wholly covered by a dark brown to black soot-like substance, older branchlets light grey and marked or roughened by slightly raised scars where phyllodes have fallen. *Stipules* persistent only at base of young phyllodes, linear to linear-triangular, 1–2(–3) mm long, slightly thickened, light brown to red-brown. *Phyllodes* mostly terete to sub-terete, a few compressed, 30–50(–60) mm long, 0.5–1 mm diam., mostly shallowly incurved, a few moderately incurved, straight or shallowly sigmoid, sub-patent to ascending but erect on new shoots, green; *longitudinal nerves* four, brown, not raised (plane or slightly impressed when dry), the surface often shiny resinous; *apices* innocuous, occasionally sub-uncinate, normally terminated by a sub-centric or excentric blunt point. *Gland* situated on upper edge of phyllode 1–1.5 mm above the pulvinus, circular, microscopic, *c.* 0.1 mm diam., easily overlooked (even at magnification), flat, a similar gland near apex of phyllode. *Inflorescences* simple, single within axil of upper phyllodes; *peduncles* 20–40 mm long, base ebracteate; *heads* globular, mostly 35–45-flowered, a few *c.* 20-flowered, 9–12 mm diam. when dry, canary yellow. *Bracteoles* 1.5 mm long; *claws* narrowly oblong,  $\pm$ expanded into distinct *laminae* which are rounded abaxially, concave adaxially, *c.* 0.5 mm wide and thickened. *Flowers* 5-merous; *sepals* free or shortly united at their base, 1/2 the length of petals, narrowly oblong, neither expanded nor thickened at their apices; *petals* 3 mm long, nerveless. *Pods* linear, (30–)45–60 mm long, (3–)4–5 mm wide, thinly crustaceous, straight or very shallowly curved, slightly undulate, flat but low-domed over the seeds with umbo extending to margin of valves,  $\pm$ straight-edged, dark brown, openly reticulate with nerves slightly raised, marginal nerve light brown and not thickened. *Seeds* longitudinal and seated in distinct depressions within the pods, obloid, 3.5 mm long, 2.2 mm wide, black,  $\pm$ shiny at centre otherwise with a satin lustre; *pleurogram* continuous, very obscure; *areole* oblong, 2 mm long, 1 mm wide; *funicle* expanded into a white *aril* that partially extends along one or both sides of the seed. (Figure 2)

*Characteristic features.* Multi-stemmed, glabrous, resinous and viscid *shrub* to *c.* 2.5 m tall, with a strong camphor-like odour when fresh. Oldest *branchlets* marked by slightly raised scars where phyllodes have fallen. *Phyllodes* mostly terete to sub-terete, 30–50(–60) mm long, 0.5–1 mm diam., mostly shallowly incurved; *longitudinal nerves* four, brown, not raised. *Inflorescences* simple; *peduncles* 20–40 mm long, base ebracteate; *heads* large (9–12 mm diam. when dry). *Flowers* 5-merous; *sepals*  $\pm$ free, 1/2 length of petals. *Pods* to 60 mm long, (3–)4–5 mm wide, linear, thinly crustaceous, dark brown, openly reticulate with nerves slightly raised. *Seeds* longitudinal, obloid, 3.5  $\times$  2.2 mm, black,  $\pm$ shiny at centre otherwise with a satin lustre; aril partially extending along one or both sides of the seed.



Figure 2. *Acacia shapelleae*. A – habitat (Helena and Aurora Range); B – multi-stemmed habit, with Shapelle McNee; C – habit; D – flowering branches showing narrow, spreading phyllodes and canary yellow heads on long peduncles. Photographs by Shapelle McNee (A), Geoff Cockerton (B) and Jennifer Jackson (C, D).

*Other specimens examined.* WESTERN AUSTRALIA: [localities withheld for conservation reasons] 8 Sep. 1988, J.J. Alford 1119 (CANB, NSW, PERTH); 8 Sep. 2010, D. Angus 05 (PERTH); 30 Oct. 2013, A.I. Craigie 1556.001 (PERTH); 3 Nov. 2000, E. Mattiske 172–162 (PERTH); 22 Nov. 2011, S. McNee LCH 34652 (MEL, PERTH); 8 Apr. 2012, S. McNee LCH 34653 (PERTH); 21 Nov. 2006, S. McNee & G. Cockerton LCS 12862 (AD, PERTH).

*Distribution.* Occurs in the Eremaean Botanical Province in the south-west extremity of the arid zone (just north of the border of the South-West Botanical Province) in Western Australia where it is known from only the Helena and Aurora Range, about 50 km north of Koolyanobbing. Current knowledge shows *A. shapelleae* as occurring in a few populations over a distance of about seven kilometres. The largest of these populations contains approximately 1,000 plants regenerating post-fire and the smallest about ten mature plants. These populations are close to areas that are likely to be proposed for mining; all occur within existing mining tenements.

The Helena and Aurora Range is contained within the Mount Manning – Helena and Aurora Ranges Conservation Park. The range was first visited by Europeans in 1861 (Gibson & Butcher 2013) and until recently remained relatively inaccessible; however, today access has been improved on account of mining exploration activity and pastoralism in the general area. The species was discovered in 1988 in connection with a biological survey of this botanically rich region.

*Habitat.* Grows in brown, silty sand-loam or clay-loam on the upper slopes and ridges of low hills comprising outcropping BIF. It occurs in tree mallee (*Eucalyptus ebbanoensis*) over dense scrub containing a range of species; in the largest population the most common associates are *Banksia arborea*, *Calycopeplus paucifolius*, *Grevillea zygomorpha*, *Lepidosperma bungalbin*, *Melaleuca nematophylla*, *Mirbelia ferricola*, *Neurachne annularis* and *Stenanthemum newbeyi* (S. McNee pers. comm.).

*Phenology.* Flowers in August and September; pods with mature seed have been collected in mid-November.

*Conservation status.* *Acacia shapelleae* is listed as Priority One under Department of Parks and Wildlife Conservation Codes for Western Australian Flora, as *Acacia* sp. Bungalbin Hill (J.J. Alford 1119) (Smith 2013). This species is habitat-specific with a very restricted geographic range and occurs in an area of active mineral exploration.

*Etymology.* This species is named for Shapelle McNee (ecologist with Western Botanical). Over the past 18 years she has conducted extensive surveys for environmental impact assessment on behalf of Western Botanical, and has been instrumental in recognition of numerous new plant species and the discovery and monitoring of populations of rare flora, particularly on the Swan Coastal Plain and the BIF ranges of the Yilgarn region. In spring 1983 Shapelle, together with colleague Mark Burgman, conducted extensive botanical surveys of poorly surveyed areas to the north of Esperance, collecting almost 1,000 specimens that are now deposited in the Western Australian Herbarium.

*Common name.* Shapelle's Wattle.

*Affinities.* *Acacia shapelleae* is most closely related to *A. glutinosissima* Maiden & Blakely. Both species are glabrous, resinous, viscid shrubs with similar stipules, inflorescences and carpological features; their phyllodes are also similar in having a total of four longitudinal nerves and a gland near both the pulvinus and the apex. The two species, however, can be distinguished by their distribution, habitat, habit and by details of their phyllodes and pods. Morphologically *A. glutinosissima* differs most obviously from *A. shapelleae* in having longer phyllodes (mostly 9–17 cm) that are sparingly tuberculate (tubercles absent in *A. shapelleae*) and flat. In *A. glutinosissima* the phyllodes are normally 2–3.5 mm wide, however, in one population from near Burracoppin they are just 1 mm wide which is within the range of the new species. Some of the youngest phyllodes on the Burracoppin plants of *A. glutinosissima* are compressed (i.e. flattened but thickened) and while these approach those of *A. shapelleae* they are never terete to sub-terete as in the new species). *Acacia glutinosissima* is further distinguished from *A. shapelleae* in having a larger gland at the base of the phyllodes (0.5–1 mm long) and longer pods (to 10 cm) that are slightly but obviously constricted between the seeds and possess nerves of the reticulum that are more prominently raised. *Acacia glutinosissima* is a rather open, spindly shrub which is either single-stemmed or sparingly divided at the base, whereas *A. shapelleae* is clearly multi-stemmed. *Acacia glutinosissima* has a scattered, discontinuous distribution in the central wheatbelt region to the west and south-west of where *A. shapelleae* occurs. It grows in the Latham–Wubin area and also from Kununoppin east to Westonia and south to Bruce Rock, where it is found on laterite or gravelly sand or loam (Maslin 2001: 461), not BIF as does the new species. The closest known population of *A. glutinosissima* to that of *A. shapelleae* is from Westonia, at 150 km south-west of the Helena and Aurora Range.

*Acacia shapelleae* also has affinities with *A. rossei* F.Muell., but the relationship is not as close as with *A. glutinosissima*. *Acacia rossei* is a spindly, erect, somewhat viscid shrub 1–3(–5) m high and

like *A. shapelleae* has conspicuous, pedunculate heads that are aggregated at the ends of the branches. *Acacia rossei* is easily distinguished from the new species by its shorter phyllodes (10–30 mm long) that are normally flat, longer stipules (2.5–4.5 mm), 65–75-flowered heads, transverse to oblique, larger seeds (4–5 mm long) and especially by its pods that are narrowly oblong, 7–11 mm wide, thick-textured (crustaceous) and roughened by prominent brown excrescences. *Acacia rossei* occurs in the wheatbelt region where it extends from Kellerberrin east to Yellowdine and south to near Hyden; it normally grows in yellow sand on plains in tall shrubland.

### Acknowledgements

I am indebted to Shapelle McNee and Geoff Cockerton (Western Botanical), Cameron Blackburn (Mattiske Consulting Pty Ltd) and Jennifer Jackson (Department of Parks and Wildlife) for providing habit, habitat, distributional details and photographs of *A. shapelleae*. Geoff Cockerton and David Coultas (Woodman Environmental Consulting Pty Ltd) are thanked for supplying specimens, habitat information and photographs of *A. haematites*. Neil Gibson (Department of Parks and Wildlife) is thanked for advice concerning the phytogeography and occurrence of taxa found on Yilgarn BIF ranges in southern Western Australia. Sandra Thomas (Department of Parks and Wildlife) is thanked for providing information on mining interests in the areas where the two new species grow. Alex George (Perth) is gratefully acknowledged for assistance in formulating the name *A. haematites*.

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